

AINHUM (DACTYLOLYSIS SPONTANEA)

REPORT OF TWO CASES FROM ILLINOIS

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THE TERM AINHUM (*ān'hum*) is of African derivation, meaning to saw or to cut, and is given to a curious disease peculiar to the dark-skinned races, especially the Negro. It is characterized by a linear, narrow, fibrous constricting band beginning at the digitoplantar fold of the little toe. This constriction becomes deeper and deeper and produces a strangulation of all the tissues under the ring together with an absorption, and many times a pathologic fracture of the bone. Gradually the distal end of the toe becomes enlarged, bulbous and remains attached by a mere pedicle. Eventually there is spontaneous amputation of the toe, sometimes hastened by injury or gangrene.

According to Spinzig,¹ Clark, in 1860, described a condition of dry gangrene of the little toe among the natives of the African Gold Coast and this is thought to be the first recognition of the disease later known as ainhum. A Brazilian physician, da Silva Lima (cited by Spinzig), first described and introduced the name ainhum in 1867, and the first pathologic studies were made by Wucherer, in Bahia, Brazil.

Most of the cases of ainhum have been reported from South America. Africa, the West Indies, India, Central America, and Madagascar. It is a rare disease in the United States and extremely rare in the northern part. All patients reported in the United States were born south of the Mason-Dixon line except two, one in Ohio and another in Illinois. A search of the American literature reveals only one case previously reported from Illinois, and that by Dr. James B. Herrick² in the Chicago Medical Recorder in 1897.

Spinzig,¹ in 1939, analyzed 41 cases which included three reported by him. Since then ten cases, including our two, have been reported (Table I). The total is 51 cases in the United States since 1881, and the second and third cases from Illinois.

CASE REPORTS

Case 1.—L. S., a colored male, age 39, was born in New Orleans, Louisiana, where he lived until he was 11 years old. He then moved to Chicago, Illinois, where he has resided for the past 28 years. Two years ago he noted for the first time a constricting band about the base of the fifth toe of his left foot. The constriction was associated with pain in the toe. A soft corn was noted in this location previous to the onset of this constricting band.

In July, 1943, he was admitted to the Cook County Hospital for a head injury. At that time a diagnosis of ainhum was made and amputation of the toe advised, which he refused to have done.

By taking hot foot baths twice daily for relief of pain, the patient managed to work the 18 months prior to entering the hospital. With the onset of cold weather in December, 1944, he began to have severe pain in the toe which interfered with walking and working. He entered Cook County Hospital, January 5, 1945, for amputation.

His personal and family histories were negative. The physical examination was completely negative except for the left fifth toe which was characterized by a deep band-like constriction following the digitoplantar fold which gave the distal portion of the toe a bulbous, edematous, pedunculated, strawberry-like appearance, with dermatitis and superficial ulceration between the toes. The toe was tender and painful upon manipulation. With warm soapy foot soaks the inflammation subsided.

The roentgenographic examination revealed soft-tissue constriction, with pathologic



FIG. 1.—Case 1. (L. S.): Photograph of toes of left foot showing soft-tissue constriction of fifth toe due to ainhum. Note characteristic outward rotation of this toe.

fracture and atrophy of the proximal phalanx of the left fifth toe, with rotation of the terminal phalanx.

The urine and blood were normal, and the Kahn test was negative.

Under sodium pentothal anesthesia, a metatarsophalangeal disarticulation of the left fifth toe, with removal of the distal end of the fifth metatarsal, was performed.

Recovery was uneventful except for an upper respiratory infection which promptly responded to treatment. Healing was by first intention, and the patient was discharged from the hospital 11 days postoperative.

Case 2.—C. G., a colored male, age 47, was admitted to the Edward Lewis Surgical Service at the Cook County Hospital on February 17, 1945. He was born in Louisiana, had lived in many of the southern states, and had been a resident of Chicago for the past 17 years.

He first noticed an indentation on the dorsum of the right little toe two and one-half years ago. Aside from a painful corn over this toe, he had no difficulty until six months ago when the pain became constant, gradually increasing in severity, and was present whether the patient wore shoes or not. Immediately prior to entering the hospital he was unable to sleep because of the pain.

Nine years ago he noticed a constricting band about the base of the left fifth toe. It produced no symptoms until it was struck accidentally by a lump of coal. One week later the toe sloughed off. The defect healed uneventfully.

TABLE I
ANALYSIS OF CASES OF "AINHUM" REPORTED IN THE U. S. SINCE REPORT BY SPINZIG IN AUGUST, 1939

Author	Year of Report	Place Where Case Seen	Birth Place	Age at Case Seen	Sex	Race	Hereditary	Sym- ptom of	Dura- tion	Age at Onset	Toe In- volved	Early Pain ?	Late Pain ?	History of Injury	Amputa- tion	Lesion at Onset?	Remarks
42 Bennett ⁴	1938	Ala.	C.M. Ga.	42	M	Negro	No	5 yrs.	37 yrs.	R. and	L. 5th	Yes	Yes	No	No	Yes	Bilat. sympathect. Lumbar transperi- toneal
43 McKnight ⁵	1940	N.C.		45 ?	M	Negro	No	1 yr.	44 yrs.	4th, 5th L.	3rd, 5th R.	Yes	Yes	No	No	No	Recur. in L. 5th and R. 4th, 17 yrs. after onset in R. 5th
44 Gerwig and Warner ⁵	1941	Md.	W.A. Md.	42 yrs.	42	M	Negro	No	2 mos.	42 yrs.	5th R.	Yes	Yes	No	No	No	Luetic
45 Gerwig and Warner ⁶	1941	Md.	R.J. S.C.	20 yrs.	41	M	Negro	9 mos.	41 yrs.	R. and L. 5th	No	No	No	No	No	No	Yes, left. Spon. on right
46 Teske ⁷	1941	Ala.	W.A. Ala.	49 yrs.	49	M	Negro	No	1 yr.	48 yrs.	R. 5th	No	Yes—R. 5th	No	Yes	Yes—itching	Yes—Surgery
47 Spencer ⁸	1942	N.Y.	G.F. Texas	17 yrs.	44	M	Negro	No	10 yrs.	34 yrs.	R. and L. 5th	Occ.	Occ.	No	Yes	Yes—corns	Luetic keratosis. Palmaris and plan- taris
48 Usery ⁹	1944	Ala.	J.G. Ala.	71 yrs.	71	M	Negro	1 mo.	71 yrs.	R. 5th	Yes	Yes	Yes	No	Yes	Yes	Old fracture rt. ankle
49 Goehring ¹⁰	1944	Penn.	P.B. Ala.	17 yrs.	43	F	Negro	No	1 yr.	42 yrs.	L. and R. 5th	Yes	Yes	No	No	No	Bilat. surgery
50 Vaughn, Howser, Shropshear	1945	Ill.	L.S. La.	28 yrs.	39	M	Negro	No	2 yrs.	37 yrs.	L. 5th	Yes	Yes	No	Yes	Yes—soft corn	Yes—soft corns
51 Vaughn, Howser, Shropshear	1945	Ill.	C.G. La.	17 yrs.	47	M	Negro	No	2.5 yrs.	44 yrs.	R. and L. 5th	No	Yes	No	No	No	Yes—L. spon. R. surg.

There is no family history of ainhum.

On admission to the hospital the essential findings were limited to the fifth toe of the right foot which presented a soft-tissue constriction at the digitoplantar fold and appeared ankylosed.

The roentgenographic examination revealed a pathologic fracture through the shaft of the proximal phalanx of the right fifth toe in the region of the constricting band, while the left fifth toe had been spontaneously amputated previously through the proximal phalanx.

The urine and blood were normal, and the Kahn test was negative.



FIG. 2.—Case 1. (L. S.): Anteroposterior roentgenogram of left toes. Note osseous changes in the fifth toe. The proximal phalanx is narrow, the cortex thinned, and there is a pathologic fracture, with rotation of the distal phalanx.

Under sodium pentothal anesthesia, a metatarsophalangeal disarticulation of the right fifth toe was performed on March 5, 1945. Healing was by first intention and the patient was discharged from the hospital a few days later following an uneventful convalescence.

ETIOLOGY

The etiology of ainhum is not fully understood. Numerous theories have been advanced from time to time but none offer a satisfactory explanation for all cases. The *leprosy* theory, advanced by Zambaco Pacha, and others, has been abandoned since leprosy affects white and colored alike, whereas ainhum affects the colored races almost exclusively. Bacteriologic and histologic studies have found no evidence of leprosy.

Syphilis has been present only in a minority of the cases.

Infections and parasites as the Chigre would not affect the dark-skinned races exclusively.

To call it an *annular scleroderma* merely begs the question of etiology and ignores the racial factor.

The term *trophoneurosis* does the same.

Mechanical injury by the wearing of a ring or irritation by sand or gravel in barefooted people seems not directly causative since the condition occurs in ringless and well-shod patients.

The susceptibility of the colored race to fibrous tissue overgrowths (keloid) aggravated by injury to exposed parts has been cited as a possible cause by Pusey.³

Heredity suggested as a factor by earlier writers played no part in the ten cases analyzed by us.

Males are predominantly affected. Spinzig, in 41 cases, found the ratio of male to female two to one. In the ten cases reported in the United States since 1939, nine are males and one female (Table I).

The disease occurs almost exclusively in the dark-skinned races, especially the Negro. Cases occasionally have been observed in Arabs, Hindus, Musselmen, Mongolians, and Chinese. According to Spinzig, only one white patient has been reported in the United States, and that case, in his opinion, was a complication of uncinariasis, an "ainhum-like" process, and was not included among his 41 "true" cases.

The lesion involves one or both of the little toes usually. In the ten cases analyzed by us (Table I) the left fifth toe was involved only once, the right fifth in three cases, bilateral fifth in five cases, the left fourth and fifth and the right third and fifth in one case. Pusey³ agrees that the fifth toe is usually involved, but states that the fingers as well as toes are affected in a few cases. Spinzig believes that this latter type of involvement is probably due to the "ainhum-like" scar constrictions, and not true ainhum. No cases reported in the United States have occurred in the fingers.

SYMPTOMS

The symptoms of ainhum are purely local. There are no constitutional symptoms. The disease is characterized by the formation of a fissure or partial circular constriction in the skin beginning usually at the fifth digitoplantar fold on the inferior medial aspect. A warty soft corn is described as sometimes being present at the onset of the disease. This was found to be present in three of the ten cases reviewed by us. Spinzig had eight cases with corns, calluses or warty growths at the onset of the disease. The fissure or furrow may appear on one fifth toe, the other remaining normal or becoming involved later, or it may appear simultaneously in both toes. Symmetry is the rule. The fissure deepens, spreads laterally and dorsally until the two wings connect on the dorsum of the foot. The toe eventually becomes completely encircled and the furrow becomes deeper and narrower as if a tight rubber band or ligature had been placed around it. This process continues until the toe remains attached by a mere slender pedicle. The bone, too, is constricted and may fracture. Beyond the ring of constriction the toe becomes enlarged,

bulbous and globular presenting the appearance of a strawberry or cherry attached to the foot by a pedicle. The nail usually remains and the skin becomes thick, dry and tough.

Early pain was recorded in six of the ten cases reviewed by us, although many writers have not found this symptom early. Late pain is usually present, especially after a pathologic fracture. In the series reviewed by us late pain was present in nine cases and in one case there was no pain. Spinzig's series recorded late pain in 34 cases, no pain in two cases, and no information was

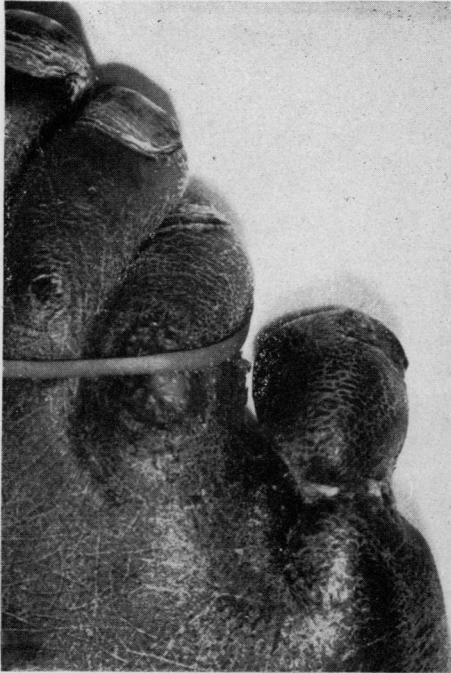


FIG. 3



FIG. 4

FIG. 3.—Case 2. (C. G.): Photograph of toes of right foot showing soft tissue constriction of fifth toe due to ainhum. Note hyperkeratotic changes of toes, with characteristic outward rotation of fifth distal phalanx.

FIG. 4.—Case 2. (C. G.): Photograph of toes of left foot showing absence of left fifth toe which was amputated spontaneously. Hyperkeratotic changes also present.

available in the other cases. Spontaneous amputation occurred in one or both toes in three cases in the series reviewed by us. There usually is no ulceration nor inflammatory signs at the onset of the disease. Ulcerations may occur late in the disease. Spinzig found seven cases of late ulceration in his series and we four cases.

The symptoms may extend over a period of years. The duration of the disease in the cases reviewed by us was from one month to ten years.

PATHOLOGY

At the site of the constriction there is a proliferation and hyperkeratosis of the surface epithelium, and fibrosis of the corium beginning at the digitoplantar

FIG. 5

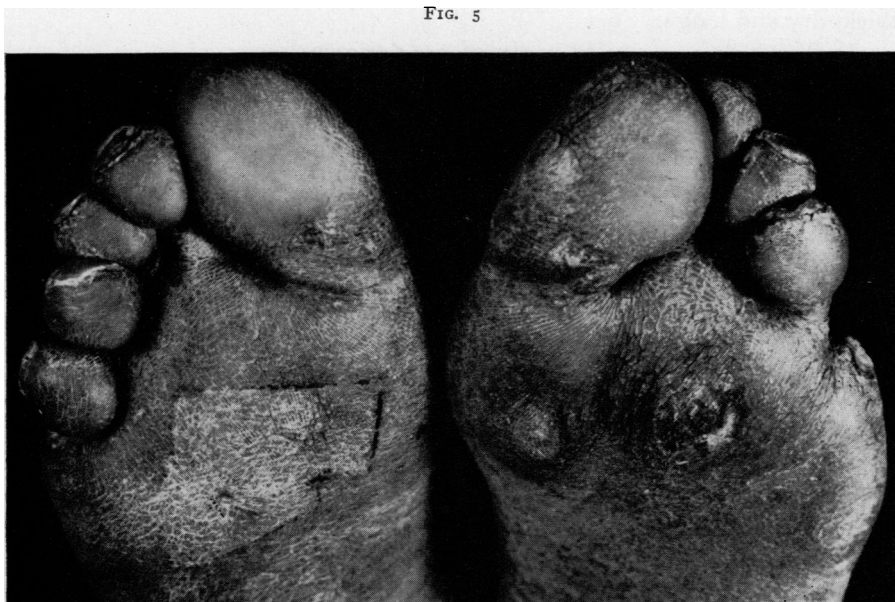


FIG. 6



FIG. 5.—Case 2 (C. G.): Photograph of toes of both feet, plantar surface, with ainhum involving the right fifth toe and an absence of the left fifth toe. Hyperkeratotic changes are present on both feet.

FIG. 6.—Case 2 (C. G.): Anteroposterior roentgenograms of both feet. Ainhum constriction on right fifth toe. There is marked thinning of the distal end of proximal phalanx and complete destruction of bone under the constriction, with rotation of the distal phalanx.

Left foot shows stump of proximal fifth phalanx following spontaneous amputation.

fold. Endarteritis and periarteritis develop distal to the band. There is some perivascular infiltration of round cells. There is gradual connective tissue replacement of all the elements of the skin and subcutaneous tissues. The

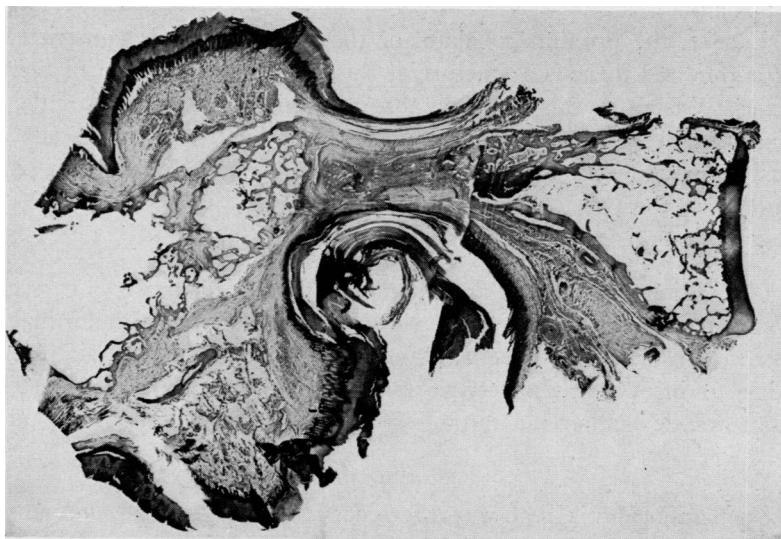


FIG. 7.—Case 1. (L. S.): Longitudinal section of toe. ($\times 5$). Note hyperkeratosis of surface epithelium and fibrosis of corium.

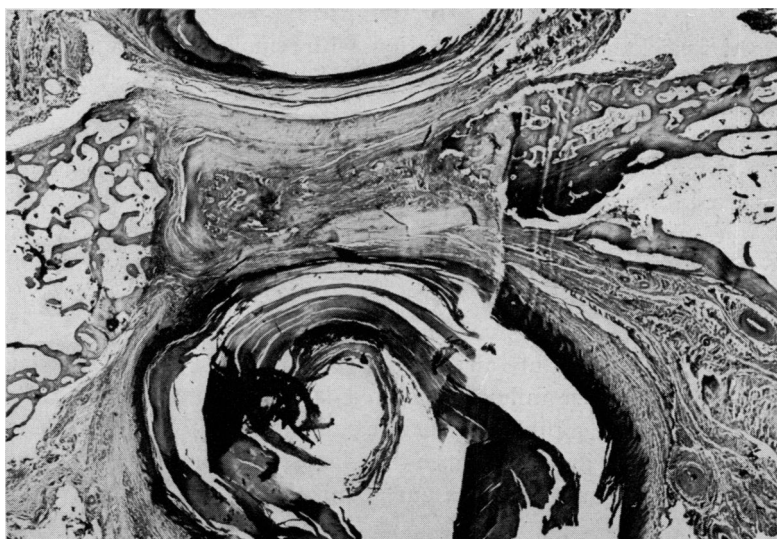


FIG. 8.—Case 1. (L. S.): Longitudinal section of toe. ($\times 12$). Note fibrous tissue replacing bone at site of pathologic fracture.

constricted bone shows a rarefying osteitis. The constriction usually involves the shaft of the proximal phalanx of the fifth toe. The two distal bony phalanges remain surprisingly intact but occasionally show rarefaction and even fragmentation.

ROENTGENOGRAPHIC FINDINGS

The characteristic roentgenographic findings are narrowing of the shaft, thinning of the cortex of the phalanx, pathologic fracture and rotation of the distal phalanx.

In Case 1, the proximal phalanx of the left fifth toe is constricted, the cortex is thin and there is a fracture at this point, with rotation of the distal phalanges. Case 2 reveals complete absorption of the distal half of the right proximal phalanx, with rotation of the toe. The left fifth was already spontaneously amputated. The proximal one-third of the proximal phalanx remained.

DIAGNOSIS

The condition is so unique and characteristic that diagnosis is easy except when seen for the first time. One who is unfamiliar with ainhum may mistake it for leprosy, syringomyelia, Raynaud's disease, neurotrophic ulcer, fissure due to injury, sclerodactylia, scleroderma, or congenital constriction from an amniotic band even after radiography, as happened in our second case.

PROGNOSIS

The general health is in no way affected. If the surgeon does not amputate the toe, nature will, but more slowly. The use of the foot is not impaired by the amputation.

TREATMENT

A metatarsophalangeal disarticulation, with removal of the metatarsal head, is the operation of choice.

SUMMARY

1. Two additional cases of ainhum are reported from Illinois. The first case reported from Illinois was in 1897, by Dr. James B. Herrick.
2. A search of the American literature reveals these to be the fiftieth and fifty-first cases, respectively, reported in the United States and the second and third from Illinois.
3. Ten recorded cases, including these two, occurring in the United States from 1939 to 1945 are analyzed.
4. With the present influx of colored labor entering the United States from the West Indies, a preemployment examination of the unshod foot by the industrial surgeon is indicated, since this disease may be more prevalent than formerly considered and may pass unrecognized.

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